

WHAT IS CLAIMED IS:

1. A method of handling abrasive solids materials used in an abrasive slurry cutting procedure of a kind which, in use, jets a high pressure abrasive slurry through a nozzle onto a work piece over and/or in a catcher tank, the handling method comprising or including catching the used abrasive slurry together with work piece kerf material in said catcher tank,

passing at least some of abrasive solids collected in the catcher tank as a slurry to a partitioning apparatus that includes a vibratory sieve,

partitioning with said partitioning apparatus the slurry to provide at least two solids streams one of which passes through the sieve and one of which passes across the sieve whilst still entrained as a slurry, and

passing as a slurry to the nozzle for jetting a pressurised or pressurisable slurry which includes partitioned solids stream that has passed through the sieve.

2. A method of claim 1 wherein there is a partitioning of the solids by the partitioning apparatus three ways, the aforementioned two solids streams and oversized solids that drop from the slurry that passes across the sieve and are at least initially retained on the sieve.

3. A method of claim 2 wherein the solids passed to the nozzle are in the size range of from about 10% to about 70% of the nozzle diameter.

4. A method of any one of the preceding claims wherein the passing as a slurry to the nozzle involves high pressure water expression from a pressure vessel.

5. A method of any one of the preceding claims wherein said partitioning apparatus comprises or includes

a housing having

a first inlet,

a first outlet, and

a collection zone or second outlet, and

a sieve disposed below said first inlet and said first outlet but above said collection zone or second outlet,

and wherein said first inlet is to receive and pass the slurry at a rate and velocity into the housing above the sieve such that at least some of the liquid component(s) of the slurry will, as a flow through, entrain small and/or less dense solids out through said first outlet,

and wherein the rate and velocity of intake into the housing via the first inlet above the sieve and the outflow via the first outlet is such as to enable at least some oversize solids to settle on the sieve (where they are of an appropriate density) and solids (not entrained out of said first outlet) of sufficient density and of a size less than that of the oversized material to pass down through the sieve.

6. A method of claim 5 wherein said sieve is a directly or indirectly shaken and/or vibratory sieve.
7. A method as claimed in any one of the preceding claims wherein said partitioning apparatus has a collection zone and there is a valved flow path therefrom to a pressure vessel from which, as required at the nozzle, high pressure water can express the solids stream to pass to the nozzle.
8. A method as claimed in claim 7 wherein there is controllable liquid and/or slurry flow path from said pressure vessel back to said collection zone of the partitioning apparatus capable of moving as a slurry more solids from said collection zone through, via the valved flow path, to said pressure vessel.
9. A method of any one of the preceding claims wherein there is included the step of providing a makeup feed of abrasive solids.
10. A method of claim 9 wherein said makeup solids are introduced into said catcher tank.
11. A method of any one of the preceding claims wherein there is provided a solids agitation water feed into the catcher tank.
12. A method of any one of the preceding claims wherein there is an overflow out take of at least water from the catcher tank.
13. A method of any one of the preceding claims wherein a control system reliant on at least one sensor provides a control of valves and pumps which determines the modes of operation of the system capable of performing the method.
14. **Abrasive slurry cutting plant** comprising or including an abrasive supply system,
a catcher tank,
a nozzle for jetting as a slurry abrasive solids onto any appropriately positioned work piece over and/or in the catcher tank,
partitioning apparatus,
a pressure vessel],

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apparatus on demand to provide a supply of high pressure water into said pressure vessel with an ability to express water and/or a slurry therefrom,

apparatus to convey as a slurry caught solids from the catcher tank to said partitioning apparatus,

apparatus to convey a useable abrasive solids stream as a slurry from the partitioning apparatus on demand to the pressurisable vessel,

(optionally) apparatus on demand to provide a water feed to the catcher tank,

(optionally) apparatus to provide, as part of the apparatus to convey a usable abrasive solids stream, a feed of water for the solids stream to pass from the partitioning apparatus to the pressure vessel.

15. Plant of claim 14 wherein there is provided apparatus to provide a makeup feed of abrasive solids.

16. Plant of claim 15 wherein said makeup feed is a feed into said catcher tank.

17. Plant of any one of claims 14 to 16 wherein the partitioning apparatus comprises or includes

a housing having

a first inlet,

a first outlet, and

a collection zone or second outlet, and

a sieve disposed below said first inlet and said first outlet but above said collection zone or second outlet,

wherein said first inlet is to receive and pass a slurry received from the catcher tank at a rate and velocity into the housing above the sieve such that at least some of the liquid component(s) of the slurry will, as a flow through, entrain a first part of the solids out through said first outlet,

and wherein the rate and velocity of intake of the slurry into the housing via the first inlet above the sieve and the outflow via the first outlet is such as to enable at least some oversize material to settle on the sieve and at least some sieve passable solids of greater density than the entrained solids of the flow through to pass down through the sieve.

18. Plant of claim 17 wherein there is a said collection zone which is a reservoir from which the collected solids as a slurry on demand (optionally with the addition of additional water) can be fed as a slurry to said pressure vessel from whence the solids may be

expressed to the nozzle under the action of high pressure water passing into such pressure vessel.

19. Plant of claim 17 or 18 wherein apparatus is included whereby said sieve, in use, vibrates and/or shakes and, in use, oversize material that settles on the sieve may migrate therefrom to a trap for such material.

20. **Partitioning apparatus** capable of partitioning the solids of a slurry at least three ways, said apparatus comprising or including

a housing having

a first inlet,

a first outlet, and

a collection zone or second outlet, and

a sieve disposed below said first inlet and said first outlet but above said collection zone or second outlet,

wherein said first inlet is to receive and pass a slurry received from the catcher tank at a rate and velocity into the housing above the sieve such that at least some of the liquid component(s) of the slurry will, as a flow through, entrain a first part of the solids out through said first outlet,

and wherein the rate and velocity of intake of the slurry into the housing via the first inlet above the sieve and the outflow via the first outlet is such as to enable at least some oversize material to settle on the sieve and at least some sieve passable solids of greater density than the entrained solids of the flow through to pass down through the sieve.

21. Apparatus of claim 20 wherein there is provided a drive whereby said sieve, in use, is capable of being actively shaken and/or vibrated.

22. Apparatus as claimed in claim 20 or 21 wherein said collection zone is a reservoir adapted so that collected solids as a slurry on demand (optionally with the addition of additional water) can be fed as a slurry to a pressure vessel.

23. **A method of partitioning solids of a slurry three ways**, said method comprising providing a housing having an inlet, a first outlet, and a second outlet or collection zone, and, disposed therein, a sieve disposed below said first inlet and said first outlet but above said second outlet or collection zone,

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passing a slurry via said inlet into the housing across the sieve and, in part, out of said first outlet whilst at least some of the solids of the slurry fall onto and/or through the sieve,

harvesting or using the solids that have passed through said sieve and out of said second outlet or into said collection zone,

harvesting or removing those solids collected on the sieve, and

harvesting or disposing of those solids that have passed out of said first outlet.

24. A method as claimed in claim 23 wherein the harvesting or using of the solids that pass out of said second outlet or into said collection zone is as a slurry.

25. A method as claimed in claim 23 or claim 24 wherein the harvesting or disposal of the solids that pass out of said first outlet is as a slurry.

26. A method as claimed in any one of claims 23 to 25 wherein the harvesting or using of the solids that pass through the sieve is by a slurry feed thereof from said collection zone or from said second outlet into a pressure vessel from whence the solids may be expressed under the action of water addition into such pressure vessel.

27. A method of any one of claims 23 to 26 wherein said slurry to be partitioned includes solids for recycle use in an abrasive water jetting system.

28. **Abrasive materials** in a water slurry for use in a jet cutting procedure prepared for such use using an at least partial recycle procedure reliant on a method of any one of claims 23 to 25.

29. Partitioning apparatus substantially as hereinbefore described with reference to any one or more of the accompanying drawings.

30. A method of partitioning solids substantially as hereinbefore described with reference to any one or more of the accompanying drawings.

31. Abrasive slurry cutting plant having a solids recycle arrangement, said plant or recycle being substantially as hereinbefore described with reference to any one or more of the accompanying drawings.

32. A method of handling abrasive solids materials substantially as hereinbefore described with reference to one or more of the accompanying drawings.